

CSI-THERMAL PROGRAM INSTALLATION INSPECTION CHECKLIST- MULTI-FAMILY & COMMERCIAL PROJECTS				
Customer Name:	Address:		Installation Contractor:	Project ID:
Initial Inspection Date:	Initial RESULTS (circle): PASS FAIL		Inspector: _____ Signature: _____	
Re-inspection Date:	Re-Inspection RESULTS (circle): PASS FAIL		Inspector: _____ Signature: _____	
CSI-Thermal Program Inspection Checklist is based on the Solar Rating and Certification (SRCC) Operating Guidelines (OG) 300, as referenced in column A. The SRCC comments are noted in the explanation column using this same font. Comments written in Italics represent explanations from the CSI-Thermal Program Administrators.				
FAILURE ITEMS				
SRCC #	Inspection Item	Explanation	Inspection Findings	Pass or Fail?
	System Operation	<i>Is the system operational? Are there any significant health/safety violations?</i>		
6.1.2	Collector	<i>The collector model and size must be consistent with the ICF and with SRCC label.</i>	Number of Collectors: Total Square Feet of Collector Area: Manufacturer: Model: Collector information consistent with ICF?:	
	SOF	<i>The ideal SOF is a value of 1.0, which is achieved by mounting the SWH collector(s) facing due south and tilted at latitude of the project site. The minimum SOF permitted to receive a CSI-Thermal Program incentive is 0.75. Collectors positioned outside of the ideal range will receive a SOF between 0.75 and 1.0 as defined in Appendix C in the Handbook. Tilt must be within ± 3° of tilt on ICF and azimuth must be within ± 5° of azimuth on ICF.</i>	Tilt: True Azimuth: SOF: SOF within allowable parameters?: SOF consistent with ICF?:	
	Shade Factor	<i>The minimum allowable average annual availability of the solar collector(s) between the hours of 10:00 am and 3:00 pm is 85 percent (15 percent average annual shade between 10:00 am and 3:00 pm). Shade Factor must be within ± 5% of shade factor on ICF.</i>	Shade Factor: Is shading within allowable parameters?: Is shading consistent with ICF?:	
	Collector Flow Balance	Ensure proper flow balancing in and among collector banks by using reverse return plumbing, flow balancing valves and adhering to manufacturer's maximum collectors allowed in banks.		
6.1.2.7	Collector Circulation Control	The collector subsystem control shall be designed to be compatible with control requirements of the system.		

	Solar Tank	For two tank systems, solar tank capacity must be at least 1 gallon of storage for each collector square foot. For one tank systems, solar tank capacity must be at least 1.25 gallons of storage for each collector square foot. If solar storage capacity is not consistent with ICF but meets the sizing requirements, this is an infraction and incentive will be adjusted.	Number of Solar Tanks: Total Solar Storage Capacity: Ratio of capacity(gal) to collector ft ² : Is the ratio above the minimum required?:	
6.1.3.3	Waterproofing	Underground and above ground unsheltered storage tanks shall be waterproofed to prevent water seepage. Storage tanks used outdoors shall be rated for outdoor use.Controls or other weather vulnerable components shall be protected from weather effects by a shed or weatherproof enclosure.		
6.1.1.1	Operating Limits	Means shall be provided to protect the SWH system within the design limits of temperature and pressure. Limit tank temperatures to a value not to exceed the tank supplier's specified hightemperature limit (unless using emergency stagnation prevention cycling.) The pressure/temperature relief valve shall not be used for this purpose under normal operating circumstances. Emergency stagnation prevention cycling is when the controller cycles the solar loop pump on and off during the day to allow the tank temperature to rise above the high temperature limit in order to prevent stagnation in the collector. The system shall be able to withstand prolonged periods of stagnation (high solar flux, no hot waterdemand) without significant system deterioration and with no maintenance. This includes conditions during loss of electrical power to the system.	Circle Stagnation Protection Mechanism: Controller with vacation mode Controller with stagnation prevention cycling mode Steam Back Heat dump radiator or convector Pressure Stagnation Protection Integral Stagnation Temperature Control Hartstat Thermosiphon Protection	
		Protection from freeze damage under the most severe environmental conditions that can be expected in actual use shall be provided for all system components containing heat transfer fluids. The supplier of each system shall specify the limit ("Freeze Tolerance Limit") to the system's tolerance of freezing weather conditions. Systems installed in a location which has no record of an ambient air temperature below 41°F may be exempted from the requirements of this paragraph except the specification of a freeze tolerance limit. Note: Since every California climate zone has experienced recorded temperatures below 41°F, freeze protection is required . For systems that rely on manual instervention for freeze protection, the Supplier shall specify the system's freeze tolerance limit based on exposure for 18 hours to a constant atmospheric temperature. SRCC will evaluate the system design to determine the reasonableness of the specified limit. For solar systems where the collector fluid is water, a minimum of two freeze protection mechanisms shall be provided on each system. Manual intervention (draining, changing valve positions, etc.) is suitable as one mechanism. At least one freeze protection mechanism, in	ICS: What is the FTL? Is this ICS system allowed in the project site climate zone? Thermosyphon: Is it closed loop with glycol?	

6.2.5	Freeze Protection Measure	addition to manual intervention, shall be designed to protect components from freeze damage, even in the event of power failure. The thermal mass of a system can be considered to be a limited form of freeze protection. A system in which components and/or piping are subject to damage by freezing shall have the proper fittings, pipe slope and collector design to allow for manual gravity draining and air filling of the affected components and piping. Pipe slope for gravity draining shall have a minimum 1/4 inch per foot vertical drop. This also applies to any header pipes or absorber plate riser tubes internal to the collector. A conspicuous label must be placed explaining how the system is protected from freezing and what actions the homeowner should take to protect the system. For systems which rely on manual intervention for freeze protection, this label shall indicate the minimum ambient temperature conditions (Freeze Tolerance Limit) below which owner action is recommended and the procedure to be followed.	<p>IFC Glycol: Is there a pressure gauge showing minimum acceptable collector loop pressure?</p> <p>IFC Drainback: Is there a water level gauge or transparent in-line flow meter installed to show the water level? Is there a 1/4 inch per foot vertical drop in the pipe slope, continuous with no interruption between the collector and storage tank?</p>	
6.1.6.3	Insulation	<i>All accessible hot water piping including recirculation loops must be insulated. This includes the hot supply line from the auxiliary water heater to the farthest accessible point of use and the return line from the farthest accessible point of use back to the auxiliary water heater. Specifically, all interconnecting hot water piping and the final 1.5 meters (five feet) of metallic cold water supply pipe leading to the system, or the length of piping which is accessible if less than 1.5 meters, shall be insulated with R-2.6 degrees Fahrenheit (ft2-hr /Btu) or greater insulation. All exterior piping insulation shall be protected from ultraviolet radiation, excessive temperature, and moisture damage.</i>		
6.1.1.5	Back Thermosyphon Prevention	Means shall be provided to prevent undesired escape of heat from storage through thermosyphoning action.	<div>Check Valve</div> <div>Solenoid Valve</div> <div>18" Heat Trap</div>	
6.2.6	Protection from Leaks	<i>All piping and components must be leak free. All roof penetrations must be properly sealed or flashed and leak free. Evidence or presence of fluid or roof leaks constitutes a failure.</i>		
6.5.6	Water Damage	Collectors and support shall be installed in such a manner that water flowing off the collector surface <i>or from the pressure relief valve</i> shall not damage the building or cause premature erosion of the roof. Water tanks located in the living space or attic shall be installed on a drip pan with a drain line to a waste or outside or have other means to safely remove any excess liquid.		
6.1.5.5 & 6.5.18	Control Line and Sensors	All wires and connections, sensors, pneumatic lines, hydraulic lines or other means for transmitting sensor outputs to control devices shall be sufficiently protected from degradation or from introducing false signals as a result of environmental influence such as wind, moisture, temperature or other factors which may alter their intended sensing function. <i>Sensor wiring shall be separated from hot collector piping and shall be protected from UV.</i>		

6.1.5.6	Temperature Control/Mixing Valve	The system shall be equipped with a mixing valve to limit scalding temperature water to the end-users, according to the manufacturer's manual. <i>Acceptable means are:</i> <i>Properly installed mixing valves or ASSE anti-scald valves with a setpoint option appropriate for use.</i> <i>Other ASSE rated anti-scald valves such as point-of-use anti-scald valves</i>		
6.6.1	Owner's Manual	An owner's manual or manuals shall be provided with each SWH system. The manual shall contain the name, phone number and address of the system supplier, the system model name or number and shall describe the operation of the system and its components and the procedures for installation, operation and maintenance. The manual shall include a comprehensive plan for maintaining the specified performance of the SWH system. The plan shall include a schedule and description of procedures for ordinary and preventive maintenance including cleaning of collector exterior surfaces. The manual shall include minor repairs and give the projections for equipment replacement.		
	Meters	Installed meters must be approved for the identified metering purpose (Opt-in Measurement & Evaluation, Customer Performance Monitoring, or 70/30 True up Payment). Meters must be installed properly and in the correct locations per the CSI-Thermal Metering Installation Guide	Metering Purpose (Circle): Opt in M&E CPM 70/30 Make: Model: Serial Number: Consistent with ICF? Approved for identified metering purpose? Properly installed?	
INFRACTIONS				
SRCC #	Inspection Item	Explanation	Inspection Findings	
	Owner's Manual	An ICS Owner's Manual shall, among normal matters, explain the owner's responsibility to drain the ICS system when the temperature may drop below the FTL. Glycol Systems Owner's Manuals shall, among other matters, recommend the next date when the glycol should be tested. Drain Back systems Owner's Manuals shall recommend regular checking by the owner of the water level.		
6.1.1.2	Solar Loop Isolation	Isolation/bypass valves must be installed to allow the system owner to bypass the solar storage tank in the case of a 2-tank system, or to shut off the cold water supply to the tanks in a 1-tank system. All isolation valves shall be labeled with their normal operating positions indicated.		
6.3.15	Pressure Relief	Each portion of the system where excessive pressures can develop shall have a pressure relief device to ensure that no section can be valved off or otherwise isolated from a relief device. Automatic pressure relief devices shall be set set to open at not more than maximum design pressure, <i>or as limited by code</i> .		
6.4.1	Operating Indicators	The SWH systems shall include means for an observer to determine readily that the system is operating properly and providing solar heated water. <i>As a minimum, a temperature indication is required for the solar storage tank.</i>		

6.3.7	Fluid Safety Labeling	Labels shall mark all drain and fill valves in the SWH system. Each label shall identify the fluid in that loop. The location of fluid handling instructions shall be referenced. The label shall list the heat exchanger type and heat transfer fluid class as defined by the American Water Works Association, Cross Connection Control Manual. (<i>Water is Class I. Propylene Glycol is Class II.</i>) The label shall include a warning that fluid may be discharged at a high temperature and/or pressure. The label shall contain the following warning: "No other fluid shall be used that would change the original classification of this system. Unauthorized alterations to this system could result in a hazardous health condition."		
6.1.3.4	Expansion Tank	Expansion tanks shall be sized in accordance with <i>manufacturer's instructions or ASHRAE methods</i> . Provision shall be made to handle all fluid thermal expansion/contraction.		
6.5.21	Rain and Snow on Collector	The location, orientation, and position of the collector surface relative to nearby objects and surfaces shall be such that water run-off from the collector surface is not impeded nor is excessive build-up of snow on lower portions of the collector glazing permitted to occur.		
6.1.5	Pumps and Control	Pumps and controllers shall be appropriate for the intended use, and shall be listed by recognized listing organizations.		
6.2.10	Buried Components	Solar components and materials that are intended to be buried in soils shall be protected from degradation under in-service conditions to insure that their function will not be impaired. <i>Use proper jacketing and flashing to prevent water penetration.</i>		
6.5.14	Pipe and Component Supports	Hangers shall provide adequate support and correct pitch of pipes. Hangers or supports for insulated pipes or components shall be designed to avoid compressing or damaging the insulation material.		
6.5.15	Pitch or Angle of Piping Installation	Piping should be sloped toward drain ports with a drainage slope of no less than 1/4 inch per foot.		
General Comments				